Cambodia Agricultural Value Chain Program Phase II (CAVACII)

Environmental Management System:

Guidance and Tools

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Revision history:

Version	Date	Author	Detail
1.0	September 2015	HS/RW	Revision of CAVAC EMS for compliance with DFAT guideline released Nov 2014
2.0	13 May 2016	HS/RW	CAVACII EMS final draft
2.1	17 May 2016	LD	1st Edit
2.1	17 May 2016	PY	Reviewed & Approved
2.1	18 May 2016	LD/HS/LT	Consistency revision

Program	refers to Australia's Ca*mbodia Agricultural Value Chain Program Phase II* (CAVACII) in Cambodia. The program may also be referred in general as the '*Cambodia Agricultural Value Chain* (CAVAC)' Program but from a contractual point of view the former is the correct definition. Cardno as the managing contractor is responsible for management of the Technical and Operations Teams supporting the overall CAVACII program.
Client	the Australian Government's Department of Foreign Affairs and Trade (DFAT) who currently have responsibility for the delivery of Australia's Aid Program.

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Tables and Figures

Acronyms

CAVACII	Cambodia Agricultural Value Chain Phase II
DFAT	Department of Foreign Affairs and Trade
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMS	Environmental Management System
EPP	Environment Protection Policy
GRM	Grievance redress mechanism
MoE	Ministry of Environment
UNESCO	United Nations Educational, Scientific and Cultural Organization
UXO	Unexploded Ordinance

1 User Guide

1.1 Layout of this document

This document sets out the Environmental Management System (EMS) tool for the Cambodia Agricultural Value Chain Program Phase II (CAVACII) . These steps are in line with the Australian Department of Foreign Affairs and Trade (DFAT) guidance on *'Environment Protection Policy for the Aid Program' (2014[1]).*

This document is set out as follows:

Section A: User Guide. This section provides guidance on how to use the EMS tools

Section 1: EMS step 1. Provides the EMS screening tool and Risk Categorisation

Section 2: EMS step 2. Provides the EMS Environmental Assessment tool

Section 3: EMS step 3. Provides the EMS Monitoring tool

Annex: Examples of the tools with completed tables.

1.2 CAVACII Components

This system is developed for Components 1 – 3 for all CAVACII interventions. Not all sections of the system may be relevant for all Components; it depends on the type of intervention and the activities that CAVACII may undertake as part of an intervention.

The Components to which this system applies are:

- **Component 1 – Productivity and Diversification:** The provision of advice and development of partnerships for the more effective use of resources and agricultural inputs.
- **Component 2 – Irrigation and Water Management:** The improvement of irrigation schemes and water use in agriculture
- **Component 3 – Milling and Export:** The development of export quality seeds and potential milling improvements.

The Components work in diverse areas, and therefore the risk to the environment is also diverse.

1.3 Guidance used by this system

This User Guide is developed in line with environmental management guidance documents which set out the approach and scope of managing environmental impacts from projects supported by the DFAT. The specific documents used are listed in Table 1 below, and outlines the purpose and source of each for further information and reference.

Table 1 List of guidance documents and their purpose

Document		Purpose
1	Department of Foreign Affairs and Trade (DFAT) Environment Protection Policy for the Aid Program November 2014 (EPP 2014)	Ensures overseas projects are in line with the Australian Environment Protection and Biodiversity Conservation Act, 1999
2	Department of Foreign Affairs and Trade (DFAT) Operational Procedures for DFAT's Environment Protection Policy November 2014 Available from CAVACII management team.	Gives guidance on how to assess the likely significance of an environmental impact
3	DFAT Good Practice Notes	Gives additional detailed guidance on how to implement the EPP

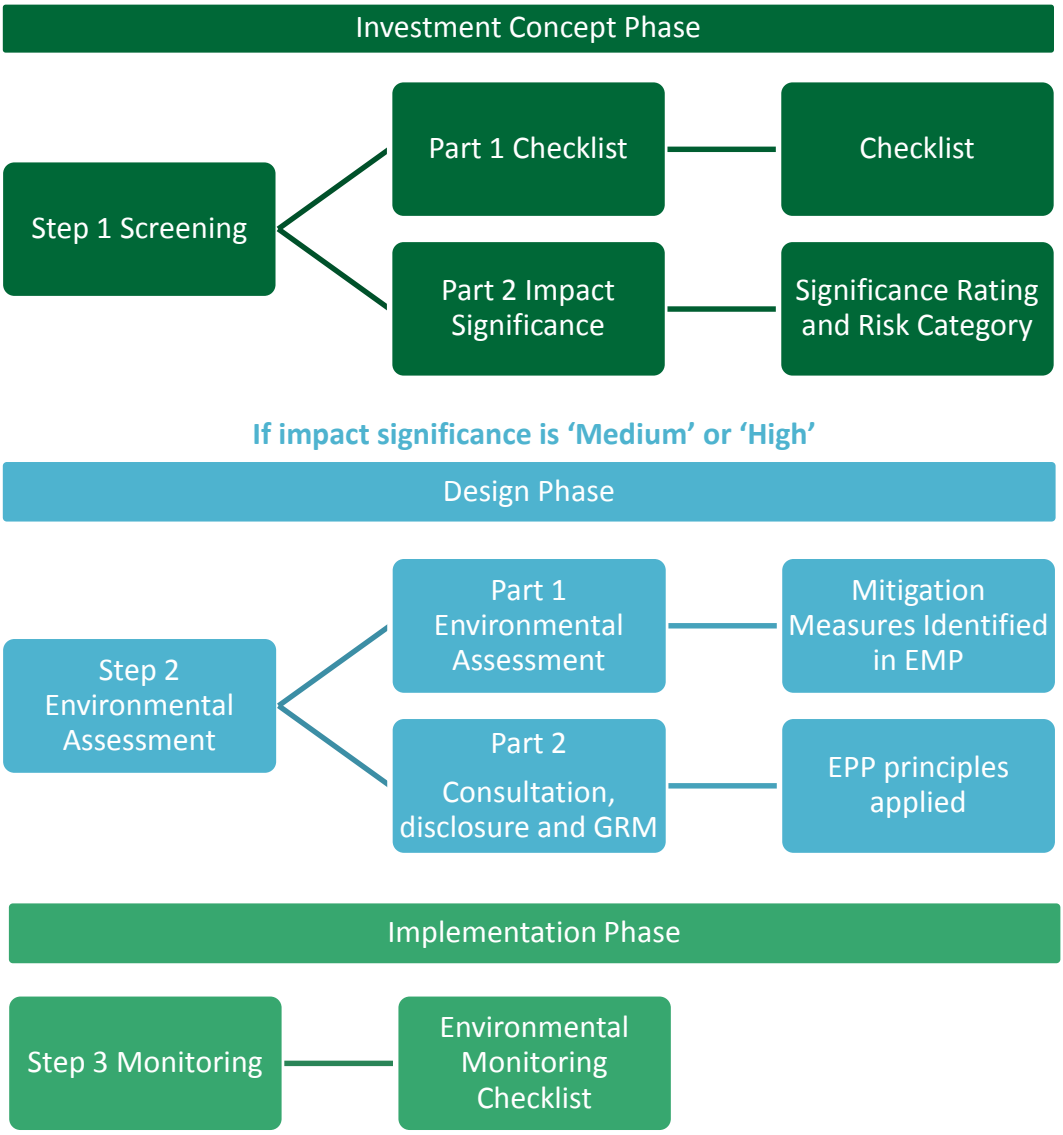
[1] www.dfat.gov.au

Document		Purpose
4	Significant impact guidelines 1.2 – Actions on, or impacting upon, Commonwealth land and Actions by Commonwealth Agencies	Gives guidance on how to assess the likely significance of an environmental impact

1.4 Environment Management System (EMS) process for CAVACII

Figure 1 shows the main EMS steps for CAVACII, in line with the guidance listed above. The EMS steps are set out according to the three (3) phases of the investment of DFAT money into a intervention. The EMS process starts at the concept phase, in which the intervention is initially screened for environmental impact. The concept phase moves to the design phase where a more formal environmental assessment is required. In the implementation phase, monitoring will take place to ensure environmental impacts are being monitored and mitigated.

Figure 1 EMS steps for CAVACII project interventions



Each of these steps is set out in the following sections of this EMS User Guide. The EMS User Guide contains the tools required to complete the steps appropriately.

In line with the DFAT's Operational Procedures, the EMS approach for CAVACII is in proportion to its potential environmental impacts.

1.5 How to use these tools

The CAVACII EMS system is designed to create tools to help CAVACII staff efficiently comply with DFAT Environment Protection Policy for the Aid Program. To ensure efficient and effective use of the system. Checklists and tables are used as 'tools' to assist staff.

Where information is required specific to the intervention being assessed, boxes are left empty for staff to complete. For example:

Project Name:	
Project Location:	

Using this approach, critical information about an intervention can be recorded and an assessment of its potential impact on the environment can be made.

1.5.1 Adding additional information

The checklist or template can assist in evaluating each intervention both at the site specific and from the office desk. CAVACII management and environmental specialist will ensure that in addition to this tool, specialist advice is sought when needed. Where necessary, this tool will continue to grow with further information, to ensure all potential environmental risks are addressed.

1.6 Step 1 Screening

1.6.1 Purpose

This step identifies if there are likely to be any environmental impacts which need to be managed. It 'screens out' interventions which do not need a detailed environmental assessment.

Screening requires basic details for the intervention and a checklist, which helps provide information for accurate screening and assessment of the impact significance. The screening step also includes looking at the legal context in which the intervention will be implemented.

1.6.2 Legal context

For CAVACII Interventions: screening are undertaken in the context of key laws and policies set out in Appendix 1.

1.6.3 How to undertake screening

The screening stage uses the relevant DFAT guidance and is in two (2) parts:

- Screening Part 1: Screening Checklist – a simple Yes / No checklist
- Screening Part 2: Impact Significance – requires the following:
  - Intervention details – What are the detailed components of the intervention?
  - Environmental context – What is the physical environment like?
  - Potential impacts – What impacts may be seen?
  - Impact avoidance and mitigation – Can impacts be avoided or mitigated?
  - Are the impacts significant? High, medium or low significance?

Screening is completed by filling in the following empty tables. The tables are:

Table 2 List of screening tables

	Table Number and Name	Information needed
Screening Part 1	Table 6 Screening checklist	Basic DFAT screening checklist (Part 1 of the screening process).
Screening Part 2	Table 7: Intervention details	Describes the intervention and all its components. The components may impact on the environment.
	Table 10: Description of environmental context	Describes the environment in which the intervention will be implemented
	Table 11: Impact screening and significance (For example, see Annex 2)	This is the key table for the screening Screens the impacts according to the size of impact and the receptors they will affect
	Table 12: CAVACII intervention risk categorisation	Final risk category for the intervention (Low, Medium, High)

When these tables are complete, Step 1 (screening) of CAVACII's EMS is finished.

1.6.4 Part 1: Screening checklist

Complete the Yes / No answers in the checklist. Use the 'Not Sure' option if there is not enough information to give a clear answer.

If the checklist contains 'Yes' or 'Not Sure' answers – continue to Part 2 'Impact Significance' in the screening stage, which assesses how significant the impacts may be.

If the checklist is all 'No' answers, the assessment is finished.

1.6.5 Part 2: Impact significance

This part of the screening answers the question: Is a significant impact on the environment likely?

In order to answer this question, the intervention components, the environmental situation and potential impacts are identified.

1.6.6 Intervention details

Complete the intervention details table first. It identifies exactly what components the intervention will entail, and therefore how it may impact on the environment.

There is a separate table for each CAVACII component. The table should be adapted for each component to ensure it is relevant to the intervention being screened.

1.6.7 Environmental context

In order to understand what impact the intervention may have, a description of the area in which the CAVACII intervention is planned is required. This gives the environmental context; some environments may be more sensitive to change than others.

Complete Table 10: Description of environmental context. This shows the environmental context according to the following types of resources:

- physical resources;
- biological resources; and
- socio-economic resources.

For each resource found in the intervention area or which may be influenced by the intervention, a description is needed, based on field visits to the intervention site, discussions with relevant experts such as engineers and stakeholders such as village residents.

1.6.8 Potential impacts, impact avoidance and impact significance

Information for this part of the screening is recorded in one (1) table, Table 11: Impact screening and significance.

This part of the screening identifies if the components will have an impact on the environmental resources identified in the 'Environmental Context' table. The impacts are considered at all stages of the intervention:

> Design stage (d) – where the design of the intervention can have an impact.

> Construction (c) – impacts during construction or implementation stage.

> Operation (o) – impacts during operation of the fully functioning intervention.

An impact is recorded if it is a direct impact or an indirect impact which may occur away from the intervention site; such as downstream impacts.

To complete the table:

> **Resource:** Resources (which may be impacted upon) are divided into Physical (P), Biological (B) and Social (S). Each has a number which helps to double check in step 2 that all resources which may be impacted upon have mitigation measures. Add other resources if relevant for the intervention.

> **Source of Impact:** Where will the impact on the resources come from; how will it be caused? Consider the Intervention details in Table 7.

> **Resource Sensitivity:** What resources will be affected? Consider the Environmental Context in Table 10. Give a sensitivity score using the matrix below.

> **Magnitude of Impact:** Give a magnitude score using the matrix below.

> **Potential Impact Significance:** Give a potential impact significance score using the matrix below.

> **Residual Impact Significance:** The potential for mitigating and avoiding impacts is recorded**.** This shows the significance of the impact **after** mitigation has taken place. This more accurately describes the impacts of the project if the requirements of the Environmental Management Plan (EMP) are followed and impacts satisfactorily mitigated.

1.6.9 Using the potential impact significance matrix

The potential impact significance matrix is used during screening to anticipate the potential significance of the environmental impacts identified in order to identify the most significant potential impacts to be addressed in the EM.

The matrix also considers the magnitude of the impact and the sensitivity of the resource it impacts on.

Table 3 Potential impact significance matrix

Resource	The resource (human / natural environment / economic / social) which is potentially going to receive and have to cope with an impact.
Magnitude	The size of the potential impact. ▪ Small-scale, low intensity impacts are considered low magnitude (e.g. local noise during a short construction project); or ▪ Large-scale, high intensity impacts are considered high magnitude (e.g. large scale removal of natural vegetation).
Sensitivity	The ability to cope with an impact and / or its importance (nationally or internationally). ▪ It is generally accepted that human health is always a high sensitivity receptor, however in terms of environmental / natural resources, the sensitivity varies according to the receptor e.g. scrubland with no significant biodiversity is considered less sensitive than a mature forest ecosystem.

Figure 2 Potential impact significance matrix

		Magnitude of Impact		
		Low	**Medium**	**High**
Sensitivity of Resource and Importance	**Low**	**Low**	**Low**	**Medium**
	Medium	**Low**	**Medium**	**High**
	High	**Medium**	**High**	**High**

The matrix above is used during the screening process to anticipate the potential significance of the environmental impacts identified, in order to identify the most significant potential impacts to be addressed in the Environmental Management Plan.

For each impact identified, the mitigation measures needed will be recorded in the Environmental Management Plan (Step 2 Environmental Assessment).

1.6.10 Risk categorisation

This step gives a final Risk Category for the CAVACII intervention. It is based on:

> operational procedures for DFAT's Environmental Protection Policy; and

> environment protection principle 2: Assess and manage environmental risks and impacts

The DFAT risk categories are:

Figure 3 DFAT risk categories

Risk category	Description of risks
Low	**Activity is considered to have minimal or no adverse impact (direct or indirect) on the environment – unlikely to have a significant impact on the environment. No further action required apart from ongoing monitoring.**
Medium	**Activity might have a significant impact on the environment (direct or indirect), particularly in the absence of mitigation measures. Impacts are typically local and short-term and are not in environmentally sensitive areas. Activities where impacts are uncertain are likely to fit into this category.**
High	**Activity is likely to have a significant impact on the environment (direct or indirect), even if mitigation measures are successfully implemented. Impacts typically affect a large or sensitive geographic area or have permanent and long-lasting effects.**

Based on the screening steps completed so far, complete Table 12: CAVACII intervention risk categorisation. Give a reason for the decision, based on DFAT's risk category description.

For all interventions which are in the Medium or High risk category, an Environmental Management Plan (EMP) is developed under Step 2: Environmental Assessment.

1.6.11 Uncertainty

Given the predictive nature of the impact assessment, there may be uncertainty. Unless otherwise indicated on Table 11: Impact screening and significance, all impacts have a degree of uncertainty, particularly if the impact may result from an accident. Because of this uncertainty, a cautionary approach is used. This is reflected in any mitigation measures in the EMP.

1.7 Step 2 Environmental Assessment

1.7.1 Purpose

This step gives detail on environmental receptors affected, and the mitigation measures needed as part of an Environmental Management Plan (EMP for the intervention. Mitigation measures will limit the environmental impacts to acceptable levels or prevent impacts from occurring.

This step also covers the DFATs Environmental Protection Policy (EPP) principles of disclosure (principle 3), consultation (principle 4) and improved environmental outcomes (principle 6).

1.7.2 How to undertake environmental assessment

The environmental assessment is to be undertaken in the design stage of the Intervention. The assessment is in two parts, which are considered the assessment terms of reference.

The environmental assessment parts 1 and 2 are the steps set out in DEPP operational procedures for interventions with an environmental risk category of 'medium' or 'high'.

The assessment is made within the legal context identified during step 1 screening.

Part 1:

Environmental Assessment looks at:

- **Receptors photo log and details:** specific environmental receptors such as the houses, schools and clinics close to the construction area. It gives the opportunity to add detailed photographs into the assessment to support CAVACII's findings.
- **Environmental benefits:** the positive outcomes of the intervention.

Part 2:

Environmental Management Plan looks at:

- **Responsible parties:** sets out who is responsible for EMS implementation.
- **Environmental Management Plan (mitigation measures):** sets out actions to mitigate any environmental or social impacts.

Part 3:

Consultation and Disclosure looks at:

- **Consultation:** gives information on who has been consulted.
- **Disclosure:** gives information on how CAVACII will communicate the findings of this assessment.
- **Grievance redress mechanism:** explains how CAVACII will manage complaints.

Parts 1–3 are completed by filling in the following Tables:

Table 4 List of tables for parts 1–3

	Table Number and Name	Information needed
Part 1 Environmental Assessment	Table 13: Receptor photo log and details	Photographs and quantitative assessment of receptors which may receive an impact
	Table 14: Environmental benefits	List any positive impacts
Part 2	Table 15: Responsible parties	State if the construction contractor requires an Environmental Management Plan as part of their contract.

	Table Number and Name	Information needed
Environmental Management Plan (EMP)		List who is responsible for what regarding mitigation measure and monitoring implementation
	Table 16: Mitigation measures – design phase (pre-construction / implementation) (For example, See Appendix 4 - 6)	Mitigation Measures Person responsible for implementation Person responsible for supervision / checking
	Table 17: Mitigation measures – construction / implementation phase (For example, See Appendix 4 - 6)	
	Table 18: Mitigation measures – operational phase (post-construction / implementation) (For example, See Appendix 4 - 6)	
Part 3 Consultation and Disclosure	Table 19: Consultation and disclosure meeting(s)	Information on consultation with stakeholders

1.8 Part 1 Environmental Assessment

1.8.1 Receptor photo log and details

Particularly for those interventions which involve physical impacts such as construction activities, Table 13: Receptor photo log and details gives an opportunity to include any photographs which provide evidence of the environment in which the intervention is taking place.

This section of the assessment is used to record field visit activities to the site. Where possible it is beneficial to quantitatively list the receptors, for example, construction impacts may affect two schools or require the removal of 20 trees.

1.8.2 Environmental benefits

The CAVACII interventions have the potential to make significant positive environmental contributions. This may be from more efficient use of resources, to changing to less harmful agricultural inputs.

All the positive environmental benefits are recorded in Table 14: Environmental benefits. List the environmental resource which is affected, e.g. soil and how the project is making a positive contribution to it, such as crop cover to prevent soil erosion.

1.9 Part 2 Environmental Management Plan – mitigation measures

1.9.1 Responsibilities and implementation arrangements

Table 15: Responsible parties asks for consideration of who is responsible for the different parts of implementing the EMS for the intervention. The responsibility will depend on the phase of the intervention.

Examples from Component 2 activities include:

- **CAVACII environmental and operations and maintenance teams – construction phase**. The CAVACII team are responsible for overseeing the EMS and ensuring it is implemented. The team is also responsible for ensuring the grievance redress mechanism is disseminated and publicised.
- **Contractor – construction phase**. The construction contractor is responsible for implementing all relevant parts of the EMS including mitigation measures which form part of the construction contract.
- **Farmer Water Users Committee – operation phase**. The Farmer Water Users Committee is responsible for maintenance of the pump and other aspects of the scheme. Individual farmers are responsible for the application of fertilizer, pesticides or other additives during operation.

1.9.2 Mitigation measures

The tool contains separate tables for each phase of the intervention (design, construction / implementation and operation). Each table is (as displayed in examples in the Annexures) are used in the Monitoring part of this EMS tool.

The tables present the mitigation measures and responsibilities for each relevant environmental impact as determined by the screening process. Included in the mitigation measures is the organisation responsible for implementing and overseeing each.

Where additional costs are attached to the mitigation measures, they are specified in the table if appropriate. If no additional cost information is provided, it is assumed that the cost of mitigation is to be incorporated into the costs of the construction or implementation contract or CAVACII's operating budget.

For construction projects, these mitigation requirements will become part of the construction contract and therefore will be legally enforceable by CAVACII.

Information required to complete the table:

- **Resource:** Resources (which may be impacted upon) were already identified in screening.
- **Impact:** The impacts were already identified in screening.
- **Mitigation requirements and example measures:** Describe how the impact extent or significance may be controlled. For the mitigation requirements, consider the *outcome* we want to achieve, e.g. prevent loss of soil. Where appropriate, examples of how to achieve the outcome are given. Some mitigation measures do not need examples as they are absolute e.g. construction work only between 8am-6pm to minimise noise nuisance.
- **Implemented by:** From the organisations listed in the 'responsibilities' table, who will implement each mitigation measure?

The EMS will need to be monitored during the intervention phase to check all the mitigation measures are being implemented. Monitoring will be carried on in accordance with the Monitoring Plan for this intervention, step 3 of CAVACII's EMS.

1.10 Part 3 Consultation and Disclosure

Table 19: Consultation and disclosure meeting(s) are held and minutes of meeting(s) record all consultation events which CAVACII staff have undertaken during the preparation of this assessment. It is an important part of the process, particularly for interventions which are community based.

Table 19 is also used to record the disclosure of the EMS to stakeholders. The EMS shall be disclosed to stakeholders in the project site and gives them an opportunity to comment on the EMS and raise any concerns.

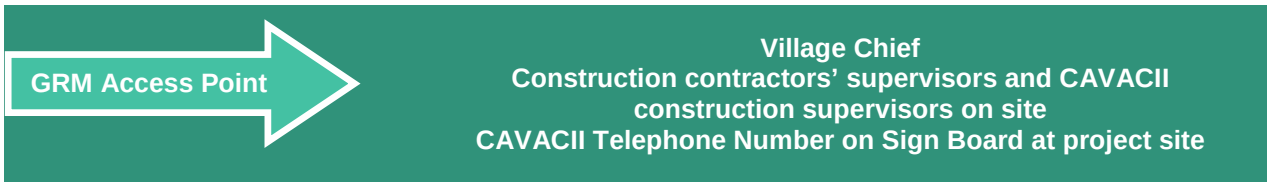
Meetings will involve specific and applicable organisations and experts, together with CAVACII's staff as required. These could be environmental specialists, government stakeholders, engineering and design experts, farmers.

1.10.1 Grievance redress mechanism

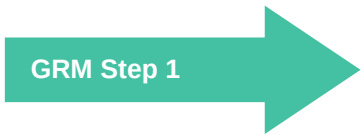
Given the likely positive impacts from CAVACII interventions and the mitigation measures implemented to ensure there are no negative impacts, grievances are not anticipated. However, a grievance redress mechanism (GRM) is necessary to ensure stakeholders can report a problem.

The following GRM can be adapted for each intervention, and be implemented during construction:

Figure 4 Grievance redress mechanism

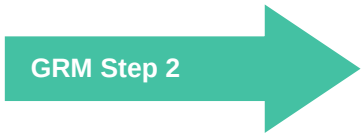


If a complaint is made – it can be made directly to the construction contractors, village chief or CAVACII. Upon receipt of a complaint, these steps will be followed:

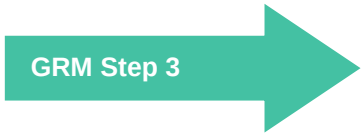


CAVACII contacted

Environmental Specialist records the complaint and allocates it to a relevant staff member (engineer, environmental, social, management) – **within three days of complaint.**

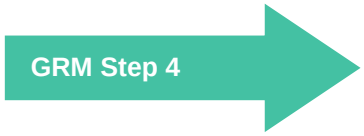


CAVACII staff member contacts the person who complained – **within five days of complaint.**



A found solution is recorded and should an Action Plan be necessary this is formulated and informed to the relevant people (e.g. Construction contractor)

– within 15 days solution is implemented.



If solution and Action Plan is not implemented appropriately and in time, the relevant CAVACII staff refers the issue to the CAVACII management team for resolution.

It is the responsibility of **CAVACII's Team** to ensure stakeholders are aware of the GRM. It will be disseminated to stakeholders such as village leaders, residents, Farmer Water Users Committee (FWUCs), construction contractors and other relevant organisations / individuals as needed.

1.11 Step 3 Monitoring

Monitoring is an essential part of the EMS. Only when something is monitored, can CAVACII make changes if an impact becomes unacceptable or if it is unforeseen.

Step 3, is completed by filling in empty tables. The tables are:

Table 5 List of tables for step 3

Table Number and Name	Information needed
▪ Table 20: Monitoring mitigation measures – design phase ▪ Table 21: Monitoring mitigation measures – construction phase ▪ Table 22: Monitoring mitigation measures – operational phase	These tables become a monitoring checklist for CAVACII's staff to use in the field. Copy the information from the previous stages of the environmental assessment and set out how each mitigation measure can be monitored.

Information required to complete the table:

> **Resource:** Identified in the EMS– mitigation measures tables. Not all resources on the Monitoring Tables will need to be monitored – only those which may be impacted upon.

> **Impact:** Identified in the EMS– mitigation measures tables.

- **Mitigation measure specified:** Identified in the EMS– mitigation measures tables.
- **Monitoring method:** The methods need to be practical and economically viable. This may include observations in the field, checking reports, or interviewing people. Laboratory analysis should be considered if needed.
- **Checked Y / N / NA:** Each time monitoring is undertaken, for example in the field, not all mitigation measures may be monitored at the same time. Use this column to say which measures were monitored.
- **Comments / actions needed:** Write down any observations if relevant. For example, if the construction contractor needs to improve soil protection measures, it should be written here.

1.11.1 Monitoring frequency

The monitoring tables can be copied repeatedly according to the number of times monitoring is undertaken.

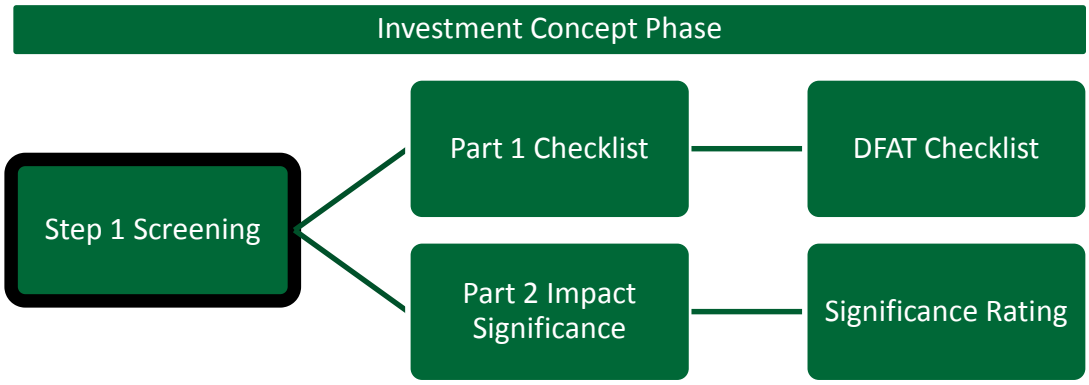
The frequency will depend on the sensitivity of the project and stage of the project, an example may be:

- **Pre-construction:** monitor / check each mitigation measure once before construction / implementation starts.
- **During construction:** monitoring every two weeks during construction / implementation or at key phases of construction.
- **Post-construction:** monitor / check each mitigation measure once before the final payment is made to construction contractors.

Each time mitigation measures are monitored, the CAVACII team will record it using the monitoring tables.

Monitoring tables printed then used in hard copy in the field can be scanned and attached to the step 3 monitoring file.

2 Step 1 Screening



This section of the EMS records the environmental screening phase for the program interventions for CAVACII. The screening approach is in line with the Australian Department of Foreign Affairs and Trade (DFAT) guidance on environmental safeguards.[2] In accordance with *Environment protection principle 2: Assess and manage environmental risks and impacts* a screening checklist for this project is completed in Table 6:

2.1 Part 1 Screening Checklist

Table 6: Screening checklist

Intervention Screened			
CAVACII Component:			
Intervention or Scheme Name:			
Intervention or Scheme Location:			
Checklist	**Yes**	**No**	**Not Sure**
Q1 Will the investment support any of the following:			
Medium- to large-scale infrastructure such as roads, bridges, railways, ports, infrastructure for energy generation; or	☐	☐	☐
Development of irrigation and drainage, diversion of water; or	☐	☐	☐
Land clearing, intensification of land use; or	☐	☐	☐
Hazardous materials and wastes; or	☐	☐	☐
Activity in mining, energy, forestry, fisheries, water supply, urban development, transport, tourism or manufacturing sectors?	☐	☐	☐
Q2 Will the investment support any of the following:			
Small- to medium-scale infrastructure such as localised water supply and / or sanitation infrastructure; irrigation and drainage; rural electrification, rural roads; or	☐	☐	☐
Construction / renovation / refurbishment / demolition of any building for example: schools, hospitals or public buildings; or	☐	☐	☐
Localised use of natural resources, including small-scale water diversion, agriculture, or other types of land-use change?	☐	☐	☐
Q3 Will the investment contribute to, directly or indirectly, or facilitate, activities such as those listed above, including through:			
Trust funds, procurement facilities; or	☐	☐	☐
Co-financing contributions; or	☐	☐	☐
Support for planning, change to regulatory frameworks, technical advice, training or;	☐	☐	☐
Applied research?	☐	☐	☐
Q4 Has an environmental review of the proposed investment already been, or will be completed by an implementing partner or donor?	☐	☐	☐
Q5. Does this investment need to meet any national environmental standards or requirements?	☐	☐	☐

If the checklist contains 'Yes' or 'Not Sure' answers – continue to Part 2 of the screening stage, which assesses how significant the impacts may be.

If the checklist is all 'No' answers, the assessment is completed.

[2] Department of Foreign Affairs and Trade (DFAT): *Environment Protection Policy for the Aid Program November 2014* (EPP 2014); *Operational Procedures for DFAT's Environment Protection Policy November 2014;* DFAT *Good Practice Notes Significant impact guidelines 1.2 – Actions on, or impacting upon, Commonwealth land and Actions by Commonwealth Agencies*

2.2 Part 2 Impact Significance

This part of screening follows:

> DFAT's Good Practice Note: 2.3 - How to assess significant impacts and environmental risks resulting from an Aid Activity; and

> Significant impact guidelines 1.2 - Actions on, or impacting upon, Commonwealth land and Actions by Commonwealth Agencies.

2.2.1 Intervention details

Complete the following table relevant to the component screened, to give information on the intervention. Amend it to make it relevant to the component screened.

Table 7: Intervention details Component 1

Description of Intervention: Component 1 – Productivity and Diversification	
All components	
Training	
Manufacture, storage, transport or use of fertilizer	
Manufacture, storage, transport or use of pesticide	
Land Clearing	
Crop introduction	
Water management	
Soil Management	
Communication	
Logistics (transportation/freight/management of facilities)	
Use / Maintenance of machinery	
Others – As CAVACII progresses	

Table 8: Intervention details Component 2

Description of Intervention Component 2 – Irrigation and Water Management	
Water Pumping Station	
Pump house Footprint (m2) ▪ Construction method	
Water source ▪ river name ▪ river size (width m) ▪ flow direction	
Water Pump ▪ energy source ▪ type of pump (if known)	
Irrigation Components – Canal Rehabilitation	
Water Intakes ▪ Location ▪ Length / width	

Description of Intervention Component 2 – Irrigation and Water Management	
Main canal ▪ Length (m) ▪ Width (m) ▪ Construction method (earth, pre-formed concrete liner) ▪ Dredging	
Secondary canals ▪ Length (m) ▪ Width (m) ▪ Construction method (earth, pre-formed concrete liner) ▪ Dredging	
Tertiary canals ▪ Length (m) ▪ Width (m) ▪ Construction method (earth, pre-formed concrete liner) ▪ Dredging	
Associated Components / Infrastructure	
Dredging (type of water way, dredging depth)	
Road Improvements (location, materials, construction method)	
Energy supply improvements	
Drinking water supply improvements	
Borrow pits	
Spoil generation and disposal	
Other components	
Operational Components	
Training	
Use of pesticides / Fertilizer	
Use of water	
Pump maintenance	
Others – As CAVACII progresses	

Table 9: Intervention details – Component 3

Description of Intervention: Component 3 – Milling and Export	
Training	
Seed development ▪ -use of pesticides and fertilizers ▪ -use of water	
Export market development	
Milling Improvements ▪ efficiency ▪ use of technology	
Transport improvements	

Description of Intervention: Component 3 – Milling and Export	
Others – As CAVACII progresses	

2.2.2 Environmental context

Complete a description of the environment in which the intervention will take place. Amend it to make it relevant to the component screened.

Table 10: Description of environmental context

Description of Environment:	
Physical Resources	
Current state of agricultural land (Component 1) ▪ coverage, crop types	
Current state of canal(s)-description (Component 2)	
Land use within 100 m of intervention area ▪ rice fields, industrial, residential, other agricultural, other uses	
Topography ▪ flat, sloping, hilly, mountains	
Soil ▪ Cambodian soil types ▪ is it likely to erode? ▪ soil fertility	
Surface water resources ▪ main rivers / streams ▪ distance to stream project intervention	
Ground water resources ▪ tube wells, ground water extraction if known	
Noise ▪ use data if available ▪ if no data, list sources of background noise in project area e.g. intermittent agricultural machinery, vehicles, industry	
Air quality ▪ use data if available ▪ if no data, list sources of air pollution in project area e.g. local brick factory, cement kilns, domestic fires	
Biological Resources	
Flora ▪ agricultural and natural vegetation types (species) ▪ include all trees	
Invasive Species ▪ such as mimosa, water hyacinth, congongrass (Imperata cylindrical)	
Fauna ▪ any non-domesticated wildlife (species) ▪ nesting birds, bats, mammals, reptiles ▪ any protected species?	

Description of Environment:	
Aquatic resources ▪ common species found and used by community ▪ rare or protected species ▪ key seasons (e.g. fish breeding)	
Protceted area ▪ is the site within a protected area? National or international protection? Yes / No	
Socio-Economic Resources	
Population ▪ residential population (houses or per head)	
Key livelihoods in project area ▪ rice, non-rice agriculture, fishing, weaving, tourism	
Electricity source(s) available in project area ▪ national grid, solar, battery	
Drinking water sources used in the project area ▪ groundwater, tube wells, rivers, other	
Waste disposal sites in project area ▪ where does the community dispose of its waste?	
Cultural and Social Resources ▪ pagodas or heritage sites ▪ social / public facilities	
Natural disasters ▪ floods, landslides	
Unexploded Ordinance (UXO)* ▪ if present in area	

*Note on UXO: At any stage in intervention design or construction it is found that UXO is highly likely in the intervention area, the CAVACII Management team will immediately re-assess the viability of the scheme implementation and record the rationale for continuing with the intervention. UXO shall be considered in the project design and mitigation measures.

2.2.3 Intervention impact screening

Using the information in the previous tables and the potential impact significance matrix, complete the table to give the significance of each potential impact.

Table 11: Impact screening and significance

#	Resource	Source of Impact	Receptor Sensitivity (High, Medium, Low)	Magnitude (High, Medium, Low)	Impact Significance (High, Medium, Low)	
					Potential	Residual
Physical Resources (P)						
P1	Soil					
P2	Surface water resource quality					
P3	Ground water resource quality					
P4	Air quality					
P5	Noise					
P6	Land Use					

#	Resource	Source of Impact	Receptor Sensitivity (High, Medium, Low)	Magnitude (High, Medium, Low)	Impact Significance (High, Medium, Low)	
					Potential	Residual
Biological Resources (B)						
B1	Flora					
B2	Invasive Species					
B3	Fauna					
B4	Aquatic resources					
B5	Protected area					
Socio-Economic Resources (S)						
S1	People-resettlement and Access					
S2	Livelihoods					
S3	Electricity					
S4	Drinking water					
S5	Waste					
S6	Cultural heritage					
S7	Community Health and Safety					
S8	Occupational Health and Safety					
S9	Natural disasters					

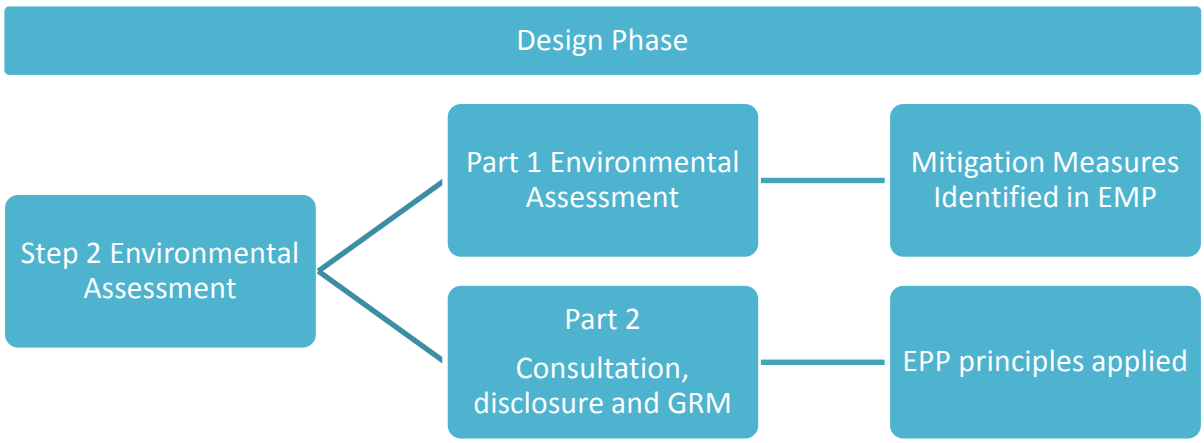
2.2.4 Risk categorisation

Based on the DFAT risk categorisation, complete the table below.

Table 12: CAVACII intervention risk categorisation

Scheme / Intervention Name	
Risk Categorisation	
Reason	

3 Step 2: Environmental Assessment



3.1 Part 1: Environmental Assessment

3.1.1 Receptors photo log and details

This environmental assessment uses information on the environmental resources and impacts identified during screening.

Table 13: Receptor photo log and details

Resource	Receptor Details	Number / Location	Photograph
Physical Resources			
Soil			
Surface water			
Ground water			
Land			
Biological Resources			
Flora			
Invasive Species			
Fauna			
Aquatic resources			
Social Resources			
People ▪ schools ▪ clinics ▪ houses ▪ other			
Livelihoods ▪ Restaurant ▪ Shops ▪ Farmers ▪ Other			
Electricity			
Drinking water			
Cultural heritage			
Other...			

3.1.2 Environmental benefits

Give any ‘good environmental outcomes’ which result from the project

Table 14: Environmental benefits

Resource:	Intervention Positive Impact:

3.2 Part 2: EMP – Mitigation Measures

3.2.1 EMP responsibilities and implementation arrangements

List who / which organisations are responsible for ensuring the EMS is implemented and the mitigation measures are in place and monitored.

Table 15: Responsible parties

Contractor Environmental Management Plan needed?	Yes	☐	No	☐
Responsible Organisation	**Responsibility for what: (Which Phase? What Actions?)**			

Table 16: Mitigation measures – design phase (pre-construction / implementation)

#	Resource	Impact	Mitigation Requirements and Example Measures	Implemented by:
Physical Resources (P)				
P1	Soil			
P2	Surface water resource quality			
P3	Ground water resource quality			
P4	Air quality			
P5	Noise			
P6	Land			
Biological Resources (B)				
B1	Flora			
B2	Invasive Species			
B3	Fauna			
B4	Aquatic resources			
B5	Protected area			
Social Resources (S)				
S1	People-resettlement and Access			
S2	Livelihoods			
S3	Electricity			
S4	Drinking water			
S5	Waste			
S6	Cultural heritage			
S7	Community Health and Safety			
S8	Occupational Health and Safety			
S9	Natural disasters			

Table 17: Mitigation measures – construction / implementation phase

#	Resource	Impact	Mitigation Requirements and Example Measures	Implemented by:
Physical Resources (P)				
P1	Soil			
P2	Surface water resource quality			
P3	Ground water resource quality			
P4	Air quality			
P5	Noise			
P6	Land			
Biological Resources (B)				
B1	Flora			
B2	Invasive Species			
B3	Fauna			
B4	Aquatic resources			
B5	Protected area			
Social Resources (S)				
S1	People-resettlement and Access			
S2	Livelihoods			
S3	Electricity			
S4	Drinking water			
S5	Waste			
S6	Cultural heritage			
S7	Community Health and Safety			
S8	Occupational Health and Safety			
S9	Natural disasters			

Table 18: Mitigation measures – operational phase (post-construction / implementation)

#	Resource	Impact	Mitigation Requirements and Example Measures	Implemented by:
Physical Resources (P)				
P1	Soil			
P2	Surface water resource quality			
P3	Ground water resource quality			
P4	Air quality			
P5	Noise			
P6	Land			
Biological Resources (B)				
B1	Flora			

#	Resource	Impact	Mitigation Requirements and Example Measures	Implemented by:
B2	Invasive Species			
B3	Fauna			
B4	Aquatic resources			
B5	Protected area			
Social Resources (S)				
S1	People-resettlement and Access			
S2	Livelihoods			
S3	Electricity			
S4	Drinking water			
S5	Waste			
S6	Cultural heritage			
S7	Community Health and Safety			
S8	Occupational Health and Safety			
S9	Natural disasters			

3.3 Part 3: Consultation and Disclosure

3.3.1 Consultation and disclosure

Complete and copy this table as many times as required to ensure all consultations and the EMS disclosure are recorded. This can include informal discussions with stakeholders, or formal meetings.

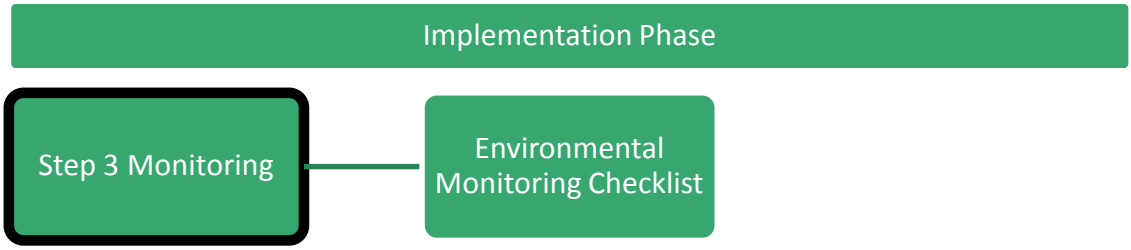
Table 19: Consultation and disclosure meeting(s)

Meeting Date	
Meeting Location	
CAVACII staff	
Number of Participants	
Type of participants (village chief, residents, water users, Farmer Water Users Group managers, farmers, private companies)	
Discussion Topic (locations, design, environmental issues, water source etc)	
Outcome (information provided, design changes, etc)	

3.3.2 Grievance redress mechanism

Review the GRM in the User Guide notes. Ensure the GRM is relevant to the intervention to which this environmental management system relates. If not, update the GRM to meet the intervention requirements.

4 Step 3: Monitoring



The tables below form the Environmental Monitoring Checklist for the intervention. Use these tables when monitoring is conducted.

Table 20: Monitoring mitigation measures – design phase

Contactor EMP Supplied		☐ Yes ☐ No	**Construction contactor EMP Approved by CAVACII**		☐ Yes ☐ No
#	**Resource**	**Mitigation Measure Specified**	**Monitoring Method**	**Checked Y / N / NA**	**Comments / Actions needed**
Physical Resources (P)					
P1	Soil				
P2	Surface water resource quality				
P3	Ground water resource quality				
P4	Air quality				
P5	Noise				
P6	Land				
Biological Resources (B)					
B1	Flora				
B2	Invasive Species				
B3	Fauna				
B4	Aquatic resources				
B5	Protected area				
Social Resources (S)					
S1	People-resettlement and Access				
S2	Livelihoods				
S3	Electricity				
S4	Drinking water				
S5	Waste				
S6	Cultural heritage				
S7	Community Health and Safety				
S8	Occupational Health and Safety				
S9	Natural disasters				

Table 21: Monitoring mitigation measures – construction phase

#	Resource	Mitigation Measure Specified	Monitoring Method	Checked Y / N / NA	Comments / Actions needed
Physical Resources (P)					
P1	Soil				
P2	Surface water resource quality				
P3	Ground water resource quality				
P4	Air quality				
P5	Noise				
P6	Land				
Biological Resources (B)					
B1	Flora				
B2	Invasive Species				
B3	Fauna				
B4	Aquatic resources				
B5	Protected area				
Social Resources (S)					
S1	People-resettlement and Access				
S2	Livelihoods				
S3	Electricity				
S4	Drinking water				
S5	Waste				
S6	Cultural heritage				
S7	Community Health and Safety				
S8	Occupational Health and Safety				
S9	Natural disasters				

Table 22: Monitoring mitigation measures – operational phase

#	Resource	Mitigation Measure Specified	Monitoring Method	Checked Y / N / NA	Comments / Actions needed
Physical Resources (P)					
P1	Soil				
P2	Surface water resource quality				
P3	Ground water resource quality				
P4	Air quality				
P5	Noise				
P6	Land				
Biological Resources (B)					
B1	Flora				
B2	Invasive Species				
B3	Fauna				

#	Resource	Mitigation Measure Specified	Monitoring Method	Checked Y / N / NA	Comments / Actions needed
B4	Aquatic resources				
B5	Protected area				
Social Resources (S)					
S1	People-resettlement and Access				
S2	Livelihoods				
S3	Electricity				
S4	Drinking water				
S5	Waste				
S6	Cultural heritage				
S7	Community Health and Safety				
S8	Occupational Health and Safety				
S9	Natural disasters				

Annex 1 Legal Context

National Laws

Sub-Decree on the Management / Administration the use of Agricultural Lands, 1985

- Defines agricultural land, and land use and administration issues.
- Relevance to CAVACII: CAVACII will not require any partner to clear previously uncultivated land therefore this sub-decree is not likely to be relevant.

The Law on Environmental Protection and Natural Resources Management, 1996

- It is the main law for protection of the environment in Cambodia. Article 6 requires environmental impact assessments to be undertaken for certain proposed projects, with the Ministry of Environment (MoE) designated as the authority to review EIAs prior to submission to the Government for approval.
- Relevance to CAVACII: See sub-decree below.

The Sub-Decree on Environmental Impact Assessment Process, 1999

- Supports the Law on Environmental Protection and Natural Resources. It sets out institutional responsibilities, environmental impact assessments requirements and environmental impact assessments procedures and processes. The annex to the sub-decree lists all projects (public or private) for which environmental assessment is required.
- Relevance to CAVACII: The Annex states that an environmental impact assessments is only required for irrigation systems
  ≥ 5,000 Hectares.

Sub-Decree on Water Pollution Control, 1999

- Aims to minimise and phase out activities which cause pollution in public water areas in order to sustain good water quality that is suitable for human use, through improving wastewater management.
- Relevance to CAVACII: The Sub-Decree generally focuses on the routine monitoring of water quality at public water areas and effluent / wastewater discharges. CAVACII interventions will not discharge effluent directly, but the law specifically applies to organisations which may become partners. Annex 3: Type of pollution sources requiring MoE Permission before discharging includes Fertilizer Manufacturing, Chemical Organic Substances Manufacturing, Pesticide Manufacturing.

Law on Water Resources Management, 2007

- This Law determines the rights and obligations of water users, the fundamental principles of water resources management, and the participation of users and their associations in the sustainable development of water resources. Article 12 states that the diversion and use of water resources for commercial (not domestic) use, and the construction of the waterworks needs a license or permit.
- Relevance to CAVACII: The formal license application shall be provided for by the Government sub-decree. However, Article 12 is not currently in force as a sub-decree has not yet been issued. CAVACII will keep up to date on this issue should the sub-decree be issued.

Sub-Decree on Air Pollution Control and Noise Disturbance, 2000

Annex 1 sets out the ambient air quality standards.

Table 23: Ambient air quality standards

Parameter	1 Hour Average mg / m^3	8 Hours Average mg / m^3	24 Hours Average mg / m^3
Carbon Monoxide (CO)	40	20	
Nitrogen dioxide (NO2)	0.3		0.1
Sulphur dioxide (SO2)	0.5		0.3
O Zone (O3)	0.2		
Lead (Pb)			0.005
Total Suspended Particulate			0.33

Annex 5 sets out maximum noise levels permitted by category of vehicle, including trucks which would be used for CAVACII intervention implementation.

Annex 6 sets out maximum noise levels in public and residential areas (dB(A)) as follows:

Table 24: Maximum noise levels in public and residential areas

Location	6am-18 h	18h-22 h	22h – 6am
Quiet areas (school, clinics)	45	40	35
Residential areas	60	50	45

> Relevance to CAVACII: These thresholds must not be exceeded.

Sub-Decree on Solid Waste Management, 2009

> The purpose is to regulate the solid waste management in order to ensure the protection of human health and the conservation of bio-diversity. It applies to all activities related to disposal, storage, collection, transport, recycling, dumping of solid hazardous and non-hazardous waste.

> Relevance to CAVACII: Subcontractors working on behalf of the CAVACII will need to be aware of the sub-decree. It states that the 'owner' of hazardous waste is responsible for it and it should be managed in line with the requirements set out in the sub-decree.

International Laws

The *Environment Protection and Biodiversity Conservation Act* 1999

> This Australian law is met by fulfilling the DFAT EPP requirements.

International treaties and conventions

> Cambodia is a signatory to many international treaties. Environmentally, the most relevant to CAVACII's work is the Ramsar Convention. Cambodia also contains a UNESCO Biosphere reserve.

> Relevance to CAVACII: The Ramsar Convention designates wetlands of international importance; Boeng Tonle Chhmar in the Tonle Sap Lake is a Ramsar site.

> The Tonle Sap is a UNESCO Biosphere Reserve; Tonle Sap Biosphere Reserve was established by Royal Decree in 2001. The Biosphere has been divided into three core areas for protection; Prek Toal in Battambang Province, Boeng Tonle Chhmar and Stoeng Sen in Kampong Thom Province.

Annex 2 Impact Screening and Significance (example)

Screening: potential impacts, impact avoidance and impact significance, using the potential impact significance matrix.

Table 25: Impact screening and significance (example)

#	Resource	Source of Impact	Receptor Sensitivity (High, Medium, Low)	Magnitude (High, Medium, Low)	Impact Significance (High, Medium, Low)	
					Potential	Residual
Physical Resources (P)						
P1	Soil	Potential contamination and erosion during excavation	Medium: maybe liable to some erosion, contamination if accidental spill	Medium: short-term, but along all length of canals	Medium	Low
P2	Surface water resource quality	Earthworks at pumping station on river bank and sediment from canal construction	Medium: medium quality water resource with higher fish but no protected species.			Low
		Use of agricultural chemicals		Medium: long-term chemical use but small concentrations may enter water in run off	Medium	Low
P3	Ground water resource quality	Accidental spillage of storage of fuel / chemicals	High: water used for drinking water	Medium: low risk given intervention components	High	Medium
P4	Air quality	Dust and fumes from construction	High: Humans are sensitive to air quality issues such as dust	Medium: short-term and localised but close to houses.	High	Medium
P5	Noise	Noise from construction and vehicles	High: Humans are sensitive to noise	Medium: short-term and localised but close to houses.	High	Medium
P6	Land	Loss of land for canal footprint	Medium: crop land will be lost as canals are rehabilitated	Low: land contributions are voluntary, impacts are therefore acceptable to farmers and relatively small area lost	Low	Low
		Borrow sites required for earthworks	Medium: agricultural land may be lost during borrow site soil extraction	Low: small area likely to be needed		
Biological resources (B)						
B1	Flora	Design requires removal of trees (species?) Along alignment	Medium. Trees adjacent to canal alignment will be removed during construction.	Medium: long-term impact, the trees are mature and will take time to be replaced and perform an ecological function, but are few in number.	Medium	Medium

#	Resource	Source of Impact	Receptor Sensitivity (High, Medium, Low)	Magnitude (High, Medium, Low)	Impact Significance (High, Medium, Low)	
					Potential	Residual
B2	Invasive Species	Construction vehicles will be in area of mimosa	Low: Mimosa already prevalent and some will be removed	Low: low risk of spreading further given already widespread species	Low	Low
B3	Fauna	Construction noise disturbance / tree removal	Medium: evidence of birds / bats using trees to roost / nest.	Medium: habitat can be replaced but will take time to mature.	Medium	Medium
B4	Aquatic resources	Erosion during pumping station / canal construction may increase sediment load	Medium: Medium quality water resource with higher fish but no protected species.	Low: short-term, low risk of soil entering water.	Low	Low
		Use of agro-chemicals may cause contaminated run-off		Medium: long-term chemical use but small concentrations may enter water in run off	Medium	Low
B5	Protected area	Construction traffic will drive through a protected area	High: nesting birds / protected mammals	Medium: short-term but may cause disturbance particularly in breeding season	High	Medium
Socio-Economic Resources (S)						
S1	People- Access	Access to houses and buildings including pagoda, clinic, school	Medium: people require continued access to services	Medium: Temporary during construction but access must be maintained.	Medium	Low
S2	Livelihoods	Dust / noise from construction	High: People using local restaurant / shops affected	Medium: short-term impacts on livelihood if customer numbers reduce	Medium	Medium
		Construction site affects access to farmland	Medium: access is possible but takes more time	Medium: short-term but access for machinery may be impaired	Medium	Low
		construction vehicles and spoil on farmland	Medium: impacts on crops and soil	Low: impact for at least one growing season but likely to be very limited land affected	Low	Low
S3	Electricity	Relocation / accidental damage to electricity pole / disruption during new connection	Low: Limited economic impact assuming short-term disruption	Low: short-term during construction / can be planned in advance	Low	Low
S4	Drinking water	Relocation / accidental damage to groundwater pump	Medium: Localised impact assuming short-term disruption and alternative pumps available.	Low: short-term during construction	Low	Low
S5	Waste	Waste from excavation, spoil, use of chemicals and workers	High: Poor waste and spoil controls could affect soil /	Medium: it is not anticipated that large quantities of hazardous wastes	Medium	Medium

#	Resource	Source of Impact	Receptor Sensitivity (High, Medium, Low)	Magnitude (High, Medium, Low)	Impact Significance (High, Medium, Low)	
					Potential	Residual
			water / crops, and public health.	will be produced but very limited capacity to manage waste in the area.		
S6	Cultural heritage	Construction noise and road impacts on religious site Damage to heritage site / archaeology	Medium: access to pagoda impaired and noise adjacent to pagoda	Medium: during construction.	Medium	Low
			High: potential damage to delicate archaeology	High- irreversible damage	High	Low
S7	Community Health and Safety	Traffic from construction and detours and increase in traffic because of construction vehicles	High: public health and safety and nuisance	Medium: short-term and contained in construction area	High	Medium
		Unauthorised access to construction sites				
S8	Occupational Health and Safety	Construction workers' health	High: occupational health affecting workers	Medium: throughout construction serious risks may arise.	High	Low
		Uxo disturbed	High: UXO could cause fatalities	Medium: Low likelihood of UXO in the selected command area	High	Medium
S9	Natural disasters	Flooding during canal construction	Medium: could affect crop land and property	Low: localised particularly in dry season construction	Low	Low

Annex 3 Receptor Photo Log and Details (example)

Part 1 Environmental Assessment – table and photographs showing potential receptors at site of intervention

Table 26: Receptor photo log and details (example)

Resource	Receptor	Number / Location	Photograph
Physical Resources (P)			
Soil	River banks	At pumping house	
	Agricultural land	Command area	
Surface water	Main river	At pumping house	
Biological resources (B)			
Flora	Trees to be removed	▪ 18 at pump house ▪ 16 along secondary canal	
Invasive Species	Mimosa	Along main canal	
Fauna	Birds nest / roosting bats or birds		
Aquatic resources	Reeds / fish breeding area / fishing gear in river	10 m from pumping station	
Socio-Economic Resources (S)			
People (affected by noise / dust)	▪ 6 houses ▪ Primary School ▪ Clinic	▪ 6 houses within 20 m of pumping house ▪ School 100 m of pumping house ▪ Clinic on main road 200 m	
Livelihoods	Restaurant / shop – food stored uncovered, people eating outside	6 along access road	
Electricity	Electricity poles	2 either side of main canal	
Drinking water	Village tube well pump	15 m from access road	

Resource	Receptor	Number / Location	Photograph
Cultural heritage	▪ Pagoda ▪ Ancient temple / archaeological site	50 m from access road	

Annex 4 Mitigation Measures – Design Phase (example)

Part 2 Environmental Management Plan – Mitigation Measures. The mitigation measures table sets out the requirements (what the contractor or design team must achieve) and example mitigation measures. **The exact mitigation measures will depend on the site**.

Table 27: Mitigation measures – design phase

#	Resource	Impact	Design Mitigation Requirements and Example Measures	Implemented By:
Physical Resources (P)				
P1	Soil			
P2	Surface water resource quality			
P3	Ground water resource quality			
P4	Air quality	Dust arising from concrete batching	P4A. Design team to specify where possible, pre-formed concrete structures made off site to reduce / eliminate concrete mixing on site.	CAVACII Environment Specialist & Irrigation Engineers
P5	Noise	Dust / noise from construction	P5A. CAVACII Social Team will undertake pre-construction consultation and disseminate GRM Example mitigation measures for P5C: ▪ Advance warning. Inform stakeholders of when noisy activities will take place; ▪ Take advice from stakeholders regarding sensitive noise receptors / timing ▪ Grievance Redress Mechanism will be disseminated and continually seek suggestions from community members to reduce noise annoyance	CAVACII Environment Specialist & Irrigation Engineers
P6	Land	Loss of land for canal footprint	▪ P6A. CAVACII Design team will minimise loss of agricultural land for canal footprint through design modifications ▪ P6B. The Contractor will submit a Borrow Site Plan to CAVACII	CAVACII Environment Specialist & Irrigation Engineers
Biological Resources (B)				
B1	Flora	Design requires removal of trees (species?) along alignment	▪ B1A. CAVACII engineers team will minimise tree loss through design ▪ B1B. The Contractor will identify and label all trees to be removed prior to their removal for approval by CAVACII. All cut trees will be given to the village authorities for their use. ▪ B1C. CAVACII Environment Specialist will consult with stakeholders and follow good practice and ensure for every tree removed, three should be replanted. This allows for some tree deaths and ensures that the area is not left with fewer trees than before the project started. Consult with stakeholders on tree species, location for replanting and after care.	CAVACII Environment Specialist & Irrigation Engineers
B2	Invasive Species	Invasive species spread during removal and disposal of vegetation	B2A. Invasive species management plan must be submitted by contractor in advance of construction including removal and disposal methodology.	CAVACII Envitonment Specialist
B3	Fauna	Disturbance of fauna from construction noise	B3A. CAVACII Environmental Specialist to advise contractors if fauna is present in the area and actions to be taken.	CAVACII Environment Specialist

#	Resource	Impact	Design Mitigation Requirements and Example Measures	Implemented By:
		and habitat disturbance	Example mitigation measures for B3A: ▪ CAVACII environmental team to consult local residents on nests / roosts / other mammals ▪ Site survey to confirm presence / absence of fauna ▪ Clear actions for contractor such as prohibition of work at sensitive times e.g. bird breeding season	
B4	Aquatic resources			
B5	Protected area	Construction traffic will drive through a protected area and habitats may be disturbed	B5A. CAVACII Environmental Specialist will consult protected area specialist / managers on specific mitigation measures needed. Example mitigation measures for B5A: ▪ Use of small construction vehicles ▪ No construction and sensitive times such as breeding season ▪ Restriction of certain equipments which may cause disturbance	CAVACII Environment Specialist
Social Resources (S)				
S1	People	Dust / noise from construction	▪ S1A. CAVACII Operations & Maintenance Team will consult with and give advance warning to people living within 300 m of construction sites which may be impacted by noise and dust ▪ S1B. CAVACII social team will disseminate the scheme's GRM to affected people	CAVACII Environment Specialist & Operations & Maintenance Team
S2	Livelihoods	Dust / noise from construction	• S2A. CAVACII Operations & Maintenance Team will consult with and give advance warning to affected people (operating restaurants / shops adjacent to construction sites) which may be impacted.	
S3	Electricity	Relocation of electricity pole / disruption during new connection	▪ S3A. CAVACII Operations & Maintenance Team will ensure all stakeholders are aware of potential power disruption in advance. ▪ Example mitigation measures for S3A: ▪ Consult stakeholders in advance regarding timing is power is to be cut ▪ The people will be informed in advance of any power cuts and the duration of the cut	CAVACII Environment Specialist
S4	Drinking water			
S5	Waste	Waste, spoil, dredged material from construction	S5A. CAVACII will consult with relevant local authorities to identify sites for waste disposal during construction and agreed disposal methods. CAVACII will advise the contractor on these 'approved sites and methodologies'.	CAVACII Environment Specialist
S6	Cultural heritage	Construction noise and impacts from excavation / earthworks	▪ S6A. CAVACII Operations & Maintenance Team will consult religious / cultural leaders in advance of construction in order to identify any sensitive dates or times which construction would have an unacceptable impact on. The leader or senior members of each site will be kept informed of the timings of construction activities in his / her area. ▪ S6B. CAVACII will consult necessary archaeological specialists when undertaking construction in an area likely to have heritage artifacts.	CAVACII Environment Specialist
S7	Community Health and Safety	Construction vehicle / construction site risks near schools	S7A. CAVACII Social Team will consult school leaders with regards to ensuring health and safety of its pupils	
S8	Occupational Health and Safety	UXO present in the construction area	S8A. The Contractor will submit a UXO Management Plan to CAVACII in advance of construction work stating (i) location of nearest	CAVACII Environment Specialist

#	Resource	Impact	Design Mitigation Requirements and Example Measures	Implemented By:
			likely UXO based on specialist advice (ii) training given to workers on UXO (iii) response to identified UXO during construction including reporting UXO	
S9	Natural disasters	Flooding potential where canals cross under roads	S9A. Design team to ensure volume of box culvert / structure used, is of adequate volume	

Annex 5 Mitigation Measures – Implementation Phase (example)

Table 28: Mitigation measures – construction / implementation phase (example)

#	Resource	Impact	Construction Mitigation Requirements and Example Measures	Implemented By:
Physical Resources (P)				
P1	Soil	Soil excavation and contamination	P1A. The Contractor will prevent loss of soil into rivers. Example mitigation measures for P1A: ▪ Construction in erosion and flood-prone areas restricted to the dry season where possible ▪ Control silt runoff particularly around permanent rivers and properly stabilise slopes ▪ P1B. The Contractor will prevent contamination of soil from chemicals, fuels and other liquids Example mitigation measures for P1B: ▪ Chemicals to be stored in secondary containers, not directly on soil.	CAVACII Environment Specialist
P2	Surface water resource quality	Earthworks at pumping station on river bank and sediment from canal construction	▪ P2A. The Contractor will protect surface water quality from sediment ▪ See P1A – control silt run off at all times	CAVACII Environment Specialist
P3	Ground water resource quality	Accidental spillage of storage of fuel / chemicals	P3A. The Contractor will prevent contamination of groundwater from chemicals, fuels and other liquids Example mitigation measures for P3A: ▪ Chemicals to be stored in secondary containers, not directly on soil ▪ Fuel store on hard standing / off site ▪ Wastewater (sewage) from construction camps to be contained and disposed off site.	CAVACII Environment Specialist
P4	Air quality	Dust and fumes from construction	P4A. The Contractor will minimise dust and odour emissions Example mitigation measures for P4A: ▪ Concrete to be mixed off site ▪ Stockpiles must be managed to reduce dust emissions. The location of the stockpile must be downwind of sensitive receptors. ▪ Dust suppression. Use of water spay on stockpiles, construction areas, cut areas and other fugitive dust sources. ▪ Construction site management. Water will be sprayed on construction sites and material handling routes where fugitive dust is generated. ▪ Transport of materials. Trucks carrying earth, sand or stone will be covered with tarpaulins or other suitable cover. Construction vehicles and machinery will be maintained to a high standard to minimise emissions. ▪ Advance warning. Before the road is constructed, people in the construction area will be given advanced warning of the works, enabling them to take measures against the dust generated	CAVACII Environment Specialist
P5	Noise	Noise from construction and vehicles	P5A. The Contractor will only operate between 8am and 6pm. P5B. The Contractor will minimise noise emissions.	CAVACII Environment Specialist

#	Resource	Impact	Construction Mitigation Requirements and Example Measures	Implemented By:
			Example mitigation measures for P5B: ▪ Source control: Maintain all exhaust systems in good working order; undertake regular equipment maintenance, enclose stationary equipment such as generators where practicable and reduce vehicle speeds around sensitive receptors including temples and schools;	
P6	Land	Borrow sites required for earthworks	P6A. The Contractor will minimise loss of useable land from borrow sites during and post-construction Example mitigation measures for P6B: ▪ Restoration of borrow sites including re-contouring to prevent accidents associated with the voids remaining ▪ Filling in borrow sites with inert material where available ▪ Selection of borrow sites on land not currently used for agriculture	CAVACII Environment Specialist
Biological Resources (B)				
B1	Flora	Tree removal during construction	B1A. Contractor will adhere to any tree removal / vegetation removal plan agreed with CAVACII.	CAVACII Environment Specialist
B2	Invasive Species	Construction vehicles will be in area of mimosa	B2A. The Contractor will minimise spread of invasive species. Example mitigation measures for B2A: ▪ Sound disposal of removed vegetation (e.g. through off site burning / burial) ▪ Wheel washing following vehicle operation in area of mimosa	CAVACII Environment Specialist
B3	Fauna	Construction noise disturbance / tree removal	B3A. Contractor will follow CAVACII's advice on mitigation measures for fauna.	CAVACII Environment Specialist
B4	Aquatic resources	Erosion during pumping station / canal construction may increase sediment load	B4A. The Contractor will protect surface water quality from sediment See P1A and P1B	CAVACII Environment Specialist
B5	Protected area	Construction traffic will drive through a protected area and may disturb habitats	B5A. The Contractor will follow CAVACII's advice on mitigation measures for operation in a protected area.	CAVACII Environment Specialist
Social Resources (S)				
S1	People-resettlement and Access	Access to houses and buildings including pagoda, clinic, school.	S1A. The Contractor will ensure access is possible at all times to roads, houses, public buildings and services.	CAVACII Environment Specialist
S2	Livelihoods	▪ Dust / noise from construction ▪ Construction site affects access to farmland ▪ Construction vehicles and spoil on farmland	S2A. The Contractor will minimise dust, odour and noise emissions which may affect adjacent livelihoods. See P4 and P5. S2B. The Contractor will ensure access to farmland at all times S2C. The Contractor will minimise negative impacts on agricultural land. Example mitigation measures for S2C: ▪ Clearly sign access routes for construction traffic and prevent driving on agricultural land and soil compaction ▪ Ensure spoil / dredged material / eroded backfill is not on agricultural land	CAVACII Environment Specialist
S3	Electricity	Accidental damage to electricity pole / disruption during new connection	S3A. the Construction contractor will contact CAVACII and the relevant authorities following unplanned / accidental disruption to electricity supplies	CAVACII Environment Specialist and

#	Resource	Impact	Construction Mitigation Requirements and Example Measures	Implemented By:
				Irrigation Engineers
S4	Drinking water	Relocation / accidental damage to groundwater pump	S4A. The Construction contractor will prevent damage to ground water pumps / tube wells. Example mitigation measures for S4A: ▪ Clearly label pumps in advance ▪ Inform all construction workers including drivers of the location. ▪ Ensure all pump / well areas are free of any construction debris and waste.	CAVACII Environment Specialist
S5	Waste	Waste from excavation, spoil, use of chemicals and workers	S5A. The Contractor will ensure waste is prevented where possible, waste does not escape and waste is disposed of in appropriate approved sites. Example mitigation measures for S5A: ▪ Prohibit burning of waste at all times ▪ Effective management of materials on site through good house-keeping and work planning, in order to generate less waste ▪ Storage and containment: Provide appropriate waste storage containers for construction and hazardous liquid wastes; Store wastes away from sensitive receptors ▪ Ensure proper removal and disposal of any significant residual materials, wastes and contaminated soils ▪ -Spoil and Inert waste management. Spoil and other inert wastes will be disposed of only in sites which are approved by CAVACII in agreement with stakeholders. Spoil / dredging will not be disposed of where it may impact on any vegetation ▪ Municipal type waste. Municipal type waste (from construction workers) will be placed in the nearest waste disposal site with approval from village / commune leaders. ▪ Hazardous waste such as oily rags or chemical containers, will be neutralised as far as possible, as dry as possible to reduce likelihood of leachate and will be disposed of in the nearest waste disposal site with approval from village / commune leaders. ▪ Litter from construction sites will be removed daily. S5B. The Contractor will ensure where technically appropriate, inert waste / spoil will be used for back fill on the site of its production.	CAVACII Environment Specialist
S6	Cultural heritage	Construction noise and impacts from excavation / earthworks	S6A. The contractor will follow CAVACII's advice regarding sensitive dates or times when construction would have an unacceptable impact on cultural / religious issues or impact on heritage artifacts.	CAVACII Environment Specialist
S7	Community Health and Safety	▪ Traffic from construction and detours and increase in traffic from construction vehicles ▪ Unauthorised access to construction areas	S7A. The Contractor will ensure the impact from construction traffic or traffic disruption due to changing access to roads is minimised. Example mitigation measures for S7A: ▪ A traffic management plan and signage to set out how access along near construction sites will be maintained safely during construction. ▪ Advance Warning. Signs will be placed along likely road closures in advance of construction giving details on the construction dates and duration ▪ Set maximum speed limits for construction traffic appropriate to the location including max 10 kmph in villages and 25 kmph in rural roads not in populated areas. S7B. The Contractor will minimise community access to construction sites in order to ensure community health and safety. Example mitigation measures for S7B:	CAVACII Environment Specialist

#	Resource	Impact	Construction Mitigation Requirements and Example Measures	Implemented By:
			▪ Warning sites and barriers for excavations ▪ Driver training and construction workers to watch for vehicles when moving in populated areas.	
S8	Occupational Health and Safety	Construction workers' health	S8A. The Construction Contractor will take all necessary measures to minimise occupational health and safety risks to its workers. Example mitigation measures for S8A: ▪ A health and safety plan, supply and use of personal protective equipment (gloves, goggles, high visibility clothing, masks). ▪ First aid plan and first aid kit on site at all times ▪ Training in safe use of equipment and chemicals S8B. The Contractor will report all occupational health and safety accidents to CAVACII S8C. The Contractor will follow the submitted UXO Management Plan	S8A CAVACII Environment Specialist S8B, S8C CAVACII Management. Team
S9	Natural disasters	Flooding during canal construction	S9A. The Contactor will minimise risk of flooding during canal construction. Example mitigation measures for S9A: ▪ Construction in dry season ▪ Use of temporary embankments to divert water flow	CAVACII Environment Specialist & Irrigation Engineers

Annex 6 Mitigation Measures – Operational Phase (example)

Table 29: Mitigation measures – operational impacts (example)

#	Resource	Impact	Mitigation Requirements and Example Measures	Implemented by:
Physical Resources (P)				
P1	Soil			
P2	Surface water resource quality	Use of agricultural chemicals	P2A. The CAVACII, Component II Team will assist operators to minimise run off from agricultural chemicals Example mitigation measures for P2A: ▪ CAVACII will conduct training to raise awareness of effective use of agricultural chemicals and pollution prevention	CAVACII Team (Intervention Managers as appropriate)
P3	Ground water resource quality			
P4	Air quality			
P5	Noise			
P6	Land	Borrow sites	P6A. The Contractor will restore (with spoil) or re-contour all borrow sites to fit in with the landscape and ensure they do not pose a risk to humans or livestock	CAVACII Environment Specialist and Irrigation Engineers
Biological Resources (B)				
B1	Flora			
B2	Invasive Species			
B3	Fauna			
B4	Aquatic resources	Use of agro-chemicals may cause contaminated run-off	B4A. The CAVACII, Component I Team will assist operators to minimise run off from agricultural chemicals See P2 – CAVACII Component 1 team training	CAVACII Team (Intervention Managers as appropriate)
B5	Protected area			
Social Resources (S)				
S1	People			
S2	Livelihoods			
S3	Electricity			
S4	Drinking water			
S5	Waste	Waste generated through construction	S5A. Contractor will ensure all construction sites are cleared of debris, waste and litter on completion	CAVACII Environment Specialist and Irrigation Engineers
S6	Cultural heritage			
S7	Community Health and Safety			
S8	Occupational Health and Safety			
S9	Natural disasters			

Annex 7 Monitoring Mitigation Measures – Design Phase (example)

Table 30: Monitoring mitigation measures (design phase)

#	Resource	Mitigation Measure Specified	Monitoring Method	Checked			Comments / Actions needed
				Y	N	N / A	
P4	Air quality	P4A. Design team to specify where possible, pre-formed concrete structures made off site to reduce / eliminate concrete mixing on site.	Meeting CAVACII Design Team	☐	☐	☐	
P5	Noise	P5B. CAVACII Social Team will undertake pre-construction consultation and disseminate GRM	Evidence from CAVACII Social Team	☐	☐	☐	
P6	Land	P6A. CAVACII Design team will minimise loss of agricultural land	Meeting CAVACII Design Team	☐	☐	☐	
		P6B. The Contractor will submit a Borrow Site Plan to CAVACII	CAVACII Approve of plan	☐	☐	☐	
B1	Flora	B1A. CAVACII engineers team will minimise tree loss through design	Meeting CAVACII Design Team	☐	☐	☐	
		B1B. The Contractor will identify and label all trees to be removed prior to their removal for approval by CAVACII	Site observation	☐	☐	☐	
		B1C. CAVACII Environmental Team will consult with stakeholders on tree replacement	Consultation	☐	☐	☐	
B2	Invasive Species	B2A. Invasive species management plan submitted by contractor	CAVACII Approve of plan	☐	☐	☐	
B3	Fauna	B3A. CAVACII Environmental Team to advise contractors if fauna is present in the area and actions to be taken.	Evidence of advice	☐	☐	☐	
B5	Protected area	B5A. CAVACII Environmental Team will consult protected area specialist on required mitigation measures	Evidence of advice provision	☐	☐	☐	
S1	People	S1A. CAVACII Social Team will consult with and give advance warning to people living within 300 m of construction sites which may be impacted by noise and dust.	Evidence from CAVACII Social Team	☐	☐	☐	
		S1B. CAVACII Social Team will disseminate GRM in the scheme area.	Evidence from CAVACII Social Team	☐	☐	☐	
S2	Livelihoods	S2A. CAVACII Social Team will consult with and give advance warning to affected people.	Evidence from CAVACII Social Team	☐	☐	☐	

#	Resource	Mitigation Measure Specified	Monitoring Method	Checked			Comments / Actions needed
				Y	N	N / A	
S3	Electricity	S3A. CAVACII Social Team will ensure all stakeholders are aware of potential power disruption.	Evidence from CAVACII Social Team	☐	☐	☐	
S4	Drinking Water	S4A. Contractor to fence off / use high visibility tape for water source to protect from construction vehicle accidents	Site observation before construction	☐	☐	☐	
S5	Waste	S5A. CAVACII Social / Env Team will consult with relevant local authorities to identify sites for waste disposal and advise the contractor	Evidence from CAVACII Social / Env Team	☐	☐	☐	
S6	Cultural heritage	S6A. CAVACII Social Team will consult religious / cultural leaders in advance of construction	Evidence from CAVACII Social Team	☐	☐	☐	
		S6B. CAVACII will consult necessary archaeological specialists when undertaking construction in an area likely to have heritage artifacts	Evidence from specialists	☐	☐	☐	
S8	Occupational H&S	S8C. The Contractor will submit a UXO Management Plan to CAVACII	Plan submitted and approved	☐	☐	☐	
S9	Natural Disaster	S9A. Design team to ensure volume of box culvert / structure used, is of adequate volume	Evidence from design team	☐	☐	☐	

Annex 8 Monitoring Mitigation Measures –Implementation Phase (example)

Table 31: Monitoring mitigation measures – construction / implementation phase

#	Resource	Mitigation Measure Specified	Monitoring Method	Checked			Comments / Actions needed
				Y	N	N / A	
P1	Soil	P1A. The Contractor will prevent loss of soil into rivers.	Site Observations	☐	☐	☐	
		P1B. The Contractor will prevent contamination of soil from chemicals, fuels and other liquids	Site Observations	☐	☐	☐	
P2	Surface water	P2A. The Contractor will protect surface water quality from sediment	Site Observations	☐	☐	☐	
P3	Ground water	P3A. The Contractor will prevent contamination of groundwater from chemicals, fuels and other liquids	Site Observations	☐	☐	☐	
P4	Air quality	P4A. The Contractor will minimise dust and odour emissions	Site Observations Consultation	☐	☐	☐	
P5	Noise	P5A. The Contractor will only operate between 8am and 6pm	Consultation	☐	☐	☐	
		P5B. The Contractor will minimise noise emissions.	Site Observations Consultation	☐	☐	☐	
P6	Land	P6A. The Contractor will minimise loss of useable land from borrow sites during and post-construction	Site observation Consultation	☐	☐	☐	
B1	Flora	B1A. Contractor will adhere to tree agreed tree removal plan	Site observation	☐	☐	☐	
B2	Invasive Species	B2A. The Contractor will minimise spread of invasive species.	Site observation	☐	☐	☐	
B3	Fauna	B3A. Contractors following CAVACII advise on fauna	Site observation	☐	☐	☐	
B4	Aquatic resources	B4A. The Contractor will protect surface water quality from sediment	See P1A and P1B	☐	☐	☐	
B5	Protected area	B5B. The Contractor will follow CAVACII's advice	Site observation of advice followed	☐	☐	☐	
S1	People	S1A. The Contractor will ensure access is possible at all times	Site Observations Consultation	☐	☐	☐	

#	Resource	Mitigation Measure Specified	Monitoring Method	Checked			Comments / Actions needed
				Y	N	N / A	
S2	Livelihoods	S2A. The Contractor will minimise dust, odour and noise emissions which may affect adjacent livelihoods	Site Observations Consultation	☐	☐	☐	
		S2B. The Contractor will ensure access to farmland at all times	Site Observations Consultation	☐	☐	☐	
		S2C. The Contractor will minimise negative impacts on agricultural land	Site Observations Consultation	☐	☐	☐	
S3	Electricity	S3A. the Contractor will contact CAVACII and the relevant authorities following unplanned / accidental disruption to electricity supplies	Site Observations Consultation	☐	☐	☐	
S4	Drinking water	S4A. The Contractor will prevent damage to ground water pumps / tube wells	Site Observations Consultation	☐	☐	☐	
S5	Waste	S5A. The Contractor will ensure waste is prevented where possible, waste does not escape and disposed of in appropriate approved sites.	Site Observations Consultation	☐	☐	☐	
		S5B. The Contractor will ensure where technically appropriate, inert waste / spoil will be used for back fill on the site of its production.	Site Observations Meet contractor	☐	☐	☐	
S6	Cultural Heritage	S6A. The contractor will follow CAVACII's advice regarding sensitive dates or times when construction would have an unacceptable impact on cultural / religious issues or impact on heritage artifacts.	Site Observations Consultation	☐	☐	☐	
S7	Community H&S	S7A. The Contractor will ensure the impact from construction traffic or traffic disruption due to changing access to roads is minimised	Site Observations	☐	☐	☐	
		S7B. The Contractor will minimise community access to construction sites to ensure community H&S	Site Observations Consultation	☐	☐	☐	

#	Resource	Mitigation Measure Specified	Monitoring Method	Checked			Comments / Actions needed
				Y	N	N / A	
S8	Occupation-al H&S	S8A. The Contractor will take all necessary measures to minimise occupational H&S risks to its workers.	Site Observations Consultation with site workers	☐	☐	☐	
		S8B. The Contractor will report all occupational H&S accidents to CAVACII	Evidence from Contractors	☐	☐	☐	
		S8C. The Contractor will follow the submitted UXO Management Plan	Site Observations	☐	☐	☐	
S9	Natural disasters	S9A. The Contactor will minimise risk of flooding during canal construction.	Site Observations Consultation	☐	☐	☐	

Annex 9 Monitoring Mitigation Measures – Operational Phase (example)

Table 32: Monitoring mitigation measures – operational phase

#	Resource	Mitigation Measure Specified	Monitoring Method	Checked			Comments / Actions needed
				Y	N	N / A	
P2	Surface water	P2A. The relevant CAVACII Team will assist operators to minimise run off from agricultural chemicals	Meeting Component 1 Team	☐	☐	☐	
P6	Land	P6A. The Contractor will restore (with spoil) or re-contour all borrow sites to fit in with the landscape and ensure they do not pose a risk to humans or livestock	Site observation	☐	☐	☐	
B4	Aquatic resources	B4A. The relevant CAVACII Team will assist operators to minimise run off from agricultural chemicals	Meeting Component 1 Team	☐	☐	☐	
S5	Waste	S5A. Contractor will ensure all construction sites are cleared of debris, waste and litter on completion.	Site Observations Consultation	☐	☐	☐	